REMARKS/ARGUMENTS

Reconsideration of this application is respectfully requested.

The above amendments merely correct two typographical errors. Entry of same is requested pursuant to 37 C.F.R. §1.116.

The Examiner is thanked for including a "Response to Arguments" section in the last Office Action. It is believed that an initial rebuttal to the Examiner's comments in this section will provide a better understanding of the situation from applicant's view point -- and facilitate an understanding of what is believed to be the clearly erroneous nature of the outstanding grounds of rejection.

Should the Examiner still not be persuaded to allow this application in light of the following, it is respectfully requested that the undersigned be telephoned for an interview.

A. Rebuttal to Examiner's Response to Arguments

The Examiner's assertion that amendments of November 2, 2006 do not further limit apparatus claims 1-14 is believed to be erroneous. Among other things, claim 1 was amended so as to require the arithmetic unit to generate MRA image data including a subtraction image related to a systolic phase and a diastolic phase on the basis of MR signals acquired during the systolic phase and the diastolic phase. As those in the art will appreciate, this requires particularized configuration of the arithmetic unit programming so as to control its *modus operandi* to produce the recited functionality. Therefore, while it is understood that the recitation of "absence of contrast agent" (in the subject being

imaged) might not be construed as a limitation to the MRI apparatus itself, clearly the recited limitations for the arithmetic unit in claim 1 do provide added structural limitations which further limit the scope of the claimed apparatus itself.

The Examiner also argues that because Licato is silent about use of a contrast agent, it is "safe to assume that non-contrast magnetic resonance imaging is entirely within the scope of the [Licato] invention". However, as those in the art will appreciate, Licato is not directed toward MRI flow imaging of any kind. Instead, Licato teaches a technique for nesting magnetic gradient pulses so as to achieve desired integrated magnetic gradient pulse areas using gradient amplifiers having maximum slew rates and amplitudes. To the extent that Licato does incidentally describe one or more MRI pulse sequences, none of them are directed toward imaging of flowing fluid. While it is of course perhaps true that Licato's nested gradient pulses could be used in the context of flow imaging, this is irrelevant to any issue presented in the present situation.

Accordingly, it is not surprising that Licato totally fails to teach or suggest any apparatus or method for generating magnetic gradient flow pulses (i.e., for de-phasing or re-phasing MR spin of a blood flow in addition to the usual gradient pulses required for MRI) -- let alone the generation of such gradient magnetic field flow pulses in the same direction as the phase encoding magnetic gradient field.

This important feature of applicant's invention (magnetic gradient flow pulses oriented parallel to the phase encoding magnetic gradient field pulses) has been emphasized throughout the original specification and claims. Such deficiencies of Licato

were pointed out in applicant's earlier remarks. The Examiner's "Response to Arguments" comments do not address the fact that Licato is irrelevant with respect to this feature of the applicant's claimed invention.

With respect to Miyazaki '376, it is noted that this reference at least does relate to MRI flow imaging. However, the Examiner's assertion that its paragraph 90 teaches magnetic gradient flow pulses oriented in the phase encoding direction is completely erroneous. At the cited paragraph 90, Miyazaki simply teaches that the direction of magnetic gradient phase encode pulses is made to align with the blood flow direction. There is nothing in this paragraph at all with respect to magnetic gradient flow pulses.

The teaching of Miyazaki with respect to magnetic gradient flow pulses is that they should be oriented in the direction of the read out magnetic gradient -- not in the direction of the phase encode magnetic gradient. See, for example, the text beginning at paragraph 138. As noted in paragraph 140, a de-phasing or re-phasing flow pulse is added to the read out gradient pulse in order to better depict blood flow in that particular embodiment. Indeed, various embodiments of such flow pulses are described at Figures 19B, 19C to be chosen as a function of flow speed.

It will be noted at paragraphs 150-153 that the read out gradient is applied in a direction which substantially agrees with the direction of blood flow. Clearly, this explicitly teaches those of skill in the art that the phase encoding gradient direction is not aligned with the direction of blood flow. That is, the direction of a phase encoding magnetic gradient is clearly not the same as the direction of the read out magnetic

gradient. If the read out gradient is aligned with the flow pulses and is aligned with the flow direction, then clearly the teaching of Miyazaki is directly against aligning the direction of the magnetic gradient flow pulse with that of the phase encoding magnetic gradient.

B. Rebuttal to Examiner's Grounds for Rejection

The rejection of claims 1-8 under 35 U.S.C. §102 as allegedly anticipated by Licato '602 is again respectfully traversed.

As previously explained, the one mention of velocity or flow compensation in Licato (at column 1, line 56) is merely in the context of explaining that in "many circumstances, the only factor of importance in the generation of a gradient field pulse is the integral of gradient amplitude over duration of the gradient pulse (i.e., the gradient pulse area)." Thus, while the nested magnetic gradient pulses of Licato might be useful in any conceivable MRI context, they are useful only with respect to accommodating gradient amplifier amplitudes and slew rates. There is nothing disclosed as particularly useful for flow imaging.

Furthermore, the passage cited by the Examiner at column 6, lines 43-59 merely describes that the time integration of a magnetic gradient pulse (of whatever type) is important. The "killer or de-phaser pulse 26" and/or the "re-phaser pulse 24" are not flow compensation gradient pulses. They are merely part of a typical non-flow MRI pulse sequence. In any event, the Examiner has incorrectly quoted the cited text. The cited text does not refer to a slice-select pulse as including but not being limited to a

number of pulses but, instead, refers to a slice-select pulse sequence. The various pulses that the Examiner refers to therein are thus seen to be part of a slice selection pulse sequence -- not a description of flow pulses in a flow imaging sequence. There is no mention of any flow compensation magnetic gradient pulses (i.e., "flow pulses") anywhere in Licato.

Licato also clearly does not teach or suggest an arithmetic unit which generates MRA image data including a subtraction image related to a systolic phase and a diastolic phase on the basis of the MR signals acquired during the systolic phase and the diastolic phase, etc. -- as is explicitly required by claim 1.

Nor does Licato teach or suggest a sequence controller which controls the phase encoding gradient magnetic field coils to generate flow pulses (for de-phasing or re-phasing MR spin of a blood flow within said subject) in the same direction as the phase encoding gradient magnetic field.

Given such fundamental deficiencies of Licato with respect to the above discussed features of apparatus claim 1, it is not necessary to discuss further deficiencies of Licato with respect to other features of independent claim 1 or of the rejected dependent claims 2-8. Suffice it to note that, as a matter of law, it is impossible for a reference to anticipate any claim unless it teaches each and every feature of that claim.

The rejection of claims 9-20 under 35 U.S.C. §103 as allegedly being made "obvious" based on Licato in view of Miyazaki '376 is also again respectfully traversed.

Fundamental deficiencies of Licato have already been noted above. Here the Examiner further refers to column 5, lines 34-67. However, this passage merely refers generically to pulse generator module 121, gradient amplifiers 127, acquisition controller 129, interface circuit 133, patient positioning system 134, etc. While it might be possible to specially configure (i.e., program) such general purpose hardware to perform a great many different pulse sequences, there is no teaching or suggestion here to configure any of the described equipment so as to meet the recitations of independent method claim 9 or independent system/apparatus claim 20.

For example, there is no teaching anywhere in Licato of generating magnetic gradient flow pulses for de-phasing or re-phasing MR spin of a blood flow within the subject in the same direction as the phase encoding magnetic gradient. Nor is there any suggestion anywhere in Licato of generating an MRA image including a subtraction image related to a systolic phase and diastolic phase on the basis of the MR signals acquired during the systolic phase and diastolic phase.

With respect to apparatus claim 20, Licato also fails to teach cardiac phase setting components configured as required by claim 20 -- or a scanning component configured to perform a first 3D scan at the first timing, etc. as required in claim 20. Nor does Licato teach any scanning component for acquiring such 3D scans based on a pulse sequence which has a magnetic gradient flow pulse in a phase encoding direction. Nor does Licato teach any image producing component configured to produce a subtraction image from a

first and second image, the first image being based on the first echo data and the second image being based on the second echo data set in the context described.

In spite of these many fundamental deficiencies of Licato with respect to the above described features of independent method claim 9 and independent apparatus claim 20, the Examiner only admits to one deficiency: "Licato fails to disclose the use of a prep scan".

This admitted deficiency of course only has relevance to claims 15-19 which require executing a prep scan in the absence of contrast agent, etc. However, independent claim 15 also requires the use of magnetic gradient flow pulses generated in the same direction as the phase encoding magnetic gradient -- in both the prep scan and the later imaging scan.

While Miyazaki surely does teach the use of a prep scan followed by an imaging scan, as already noted above, the explicit teaching of Miyazaki is completely contrary to the requirement of all independent claims (including independent claim 15) that the magnetic gradient flow pulses be generated in the same direction as the phase encoding magnetic gradient.

Accordingly, even if Licato is in some fashion combined with Miyazaki *arguendo* (i.e., the nested gradient pulses of Licato are used in the Miyazaki flow imaging teaching), one would still totally fail to achieve the applicant's claimed invention.

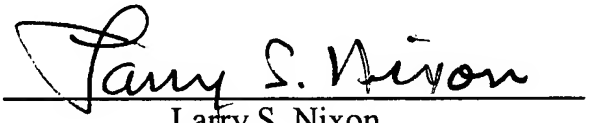
Given the fundamental deficiencies of both these references with respect to the above discussed features of the independent claims 1, 9, 15 and 20, it is not believed

necessary at this time to discuss additional deficiencies of this allegedly "obvious" combination of references with respect to other features of applicant's independent claims or added features of the rejected dependent claims.

Accordingly, this application is believed to be in allowable condition and a formal Notice to that effect is respectfully solicited.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: 
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